

### AMENDMENTS TO THE CLAIMS

1. (CURRENTLY AMENDED): An assay plate and electrode assembly, comprising:

at least one sample well having electrodes placed therein, wherein said electrodes are substantially parallel, non-overlapping strips positioned substantially parallel to the bottom surface of the well, ~~wherein a potential difference is applied to said electrodes to provide a non-rotating electric field adjacent to said bottom surface that varies by less than about 10% from a mean field intensity over at least about 20% of the surface area of said bottom surface; and~~

an electrical stimulation generator configured to apply a potential difference to said electrodes to provide a non-rotating electric field adjacent to said bottom surface that varies by less than about 10% from a mean field intensity over at least about 20% of the surface area of said bottom surface, said electric field having a strength high enough to modulate cells' transmembrane potentials but not high enough to cause electroporabilization of the cells' membranes.

~~a plurality of cells placed within the at least one sample well, said cells comprising one or more membrane ion channels, wherein said electric field has a strength high enough to modulate the cells' transmembrane potentials but not high enough to cause electroporabilization of the cells' membranes.~~

2. (CANCELLED)

3. (ORIGINAL): The assembly of Claim 1, comprising two electrodes per sample well.

4. (CANCELLED)

5. (CANCELLED)

6. (ORIGINAL): The assembly of Claim 1, wherein said bottom surface comprises a high optical transmittance portion.

7. (ORIGINAL): The assembly of Claim 6, wherein said high transmittance portion is made from a material selected from the group consisting of glass, quartz, cycloolefin, Aclar, polypropylene, polyethylene and polystyrene.

8. (ORIGINAL): The assembly of Claim 6, wherein said high transmittance portion exhibits less fluorescence when excited with UV light in the range of 250 nm to 400 nm than polystyrene.

9. (CANCELLED)

10. (ORIGINAL): The assembly of Claim 1, wherein said plate comprises up to 96 wells.

11. (ORIGINAL): The assembly of Claim 1, wherein said plate comprises greater than 96 wells.

12. (ORIGINAL): The assembly of Claim 11, wherein said plate comprises greater than 384 wells.

13. (ORIGINAL): The assembly of Claim 1, wherein said electrodes are made of a material selected from the group consisting of gold, platinum, palladium, chromium, molybdenum, iridium, tungsten, tantalum and titanium.

14. (CANCELLED)

15. (CANCELLED)

16. (CANCELLED)

17. (CANCELLED)

18. (CANCELLED)

19. (CURRENTLY AMENDED): An assay apparatus comprising:

a sample well;

a first pair of electrodes positioned within said sample well, wherein said first pair of electrodes are substantially planar, substantially parallel to each other, and substantially perpendicular to the bottom surface of the well;

at least one additional electrode positioned within said sample well, wherein said at least one additional electrode is substantially planar and substantially parallel to said first pair of electrodes; and

an electrical stimulation generator configured to apply a potential difference to the first pair of electrodes and the at least one additional electrode to provide a non-rotating

electric field having a strength high enough to modulate cells' transmembrane potentials but not high enough to cause electroporabilization of the cells' membranes.

~~a plurality of cells placed within the sample well, said cells comprising one or more membrane ion channels, wherein a potential difference is applied to the first pair of electrodes and the at least one additional electrode to provide a non-rotating electric field that has a strength high enough to modulate the cells' transmembrane potentials but not high enough to cause electroporabilization of the cells' membranes.~~

20. (PREVIOUSLY PRESENTED): The assay apparatus of Claim 19, wherein said at least one additional electrode comprises second and third pairs of electrodes.

21. (PREVIOUSLY PRESENTED): The assay apparatus of Claim 20, wherein second and third pairs of electrodes are charged to a potential less than that of the first pair of electrodes.

22. (ORIGINAL): The assay apparatus of Claim 19, wherein said electrodes are positioned with respect to the bottom surface of the well to provide an electric field adjacent to said bottom surface that varies by less than about 10% from a mean field intensity over at least about 20% of the surface area of said bottom surface.

23. (CURRENTLY AMENDED): An assay plate and electrode assembly, comprising:

at least one sample well having electrodes placed therein, wherein said electrodes are substantially planar, substantially parallel to each other, substantially perpendicular to the bottom surface of the well, and spaced from the bottom surface of the well a distance of about 0.1 mm to 0.5 mm; and

an electrical stimulation generator configured to apply a potential difference to the electrodes to provide a non-rotating electric field having a strength high enough to modulate cells' transmembrane potentials but not high enough to cause electroporabilization of the cells' membranes.

~~a plurality of cells placed within the sample well, said cells comprising one or more membrane ion channels, wherein a potential difference is applied to the electrodes to provide a non-rotating electric field that has a strength high enough to modulate the~~

~~cells' transmembrane potentials but not high enough to cause electroporation of the cells' membranes.~~

24. (PREVIOUSLY PRESENTED): The assembly of Claim 23 wherein said distance is about 0.1 mm.

25. (PREVIOUSLY PRESENTED): The assembly of Claim 23 wherein two of said electrodes are positioned on opposing sides of said sample well.

26. (PREVIOUSLY PRESENTED): The assembly of Claim 23, comprising two electrodes per sample well.

27. (PREVIOUSLY PRESENTED): The assembly of Claim 23, comprising more than two electrodes per sample well.

28. (PREVIOUSLY PRESENTED): The assembly of Claim 23, wherein said bottom surface comprises a high optical transmittance portion.

29. (PREVIOUSLY PRESENTED): The assembly of Claim 23, wherein said high transmittance portion is made from a material selected from the group consisting of glass, quartz, cycloolefin, Aclar, polypropylene, polyethylene and polystyrene.

30. (PREVIOUSLY PRESENTED): The assembly of Claim 29, wherein said high transmittance portion exhibits less fluorescence when excited with UV light in the range of 250 nm to 400 nm than polystyrene.

31. (PREVIOUSLY PRESENTED): The assembly of Claim 23, wherein said plate comprises up to 96 wells.

32. (PREVIOUSLY PRESENTED): The assembly of Claim 23, wherein said plate comprises greater than 96 wells.

33. (PREVIOUSLY PRESENTED): The assembly of Claim 32, wherein said plate comprises greater than 384 wells.

34. (PREVIOUSLY PRESENTED): The assembly of Claim 23, wherein said electrodes are made of a material selected from the group consisting of gold, platinum, palladium, chromium, molybdenum, iridium, tungsten, tantalum and titanium.

35. (PREVIOUSLY PRESENTED): The assembly of Claim 23, wherein said electrodes are separated by a gap within the range of about 1 to 4 mm.

36. (PREVIOUSLY PRESENTED): The assembly of Claim 23, wherein said electrodes are separated by a gap within the range of about 0.1 to 1 mm.

37. (PREVIOUSLY PRESENTED): The assembly of Claim 23, wherein said electrodes are separated by a gap within the range of about 0.01 to 0.1 mm.

38. (PREVIOUSLY PRESENTED): The assembly of Claim 23 further comprising at least one insulator.

39. (CURRENTLY AMENDED): The assembly of Claim 38 wherein said at least one insulator is positioned between two of said electrodes, and said insulator is substantially planar and substantially perpendicular to said electrodes.

40. (PREVIOUSLY PRESENTED): The assembly of Claim 39 wherein said at least one insulator comprises two insulators that are substantially perpendicular to the bottom surface of said well.

41. (PREVIOUSLY PRESENTED): The assembly of Claim 39 wherein said at least one insulator is substantially parallel to the bottom surface of said well.